



Potential automotive applications

### THERMHEX PP SANDWICH PANEL

The ThermHex PP sandwich panel production is based on the patented ThermHex process. The process enables the continuous inline production of thermoplastic honeycomb cores in a fully automatic production line.

By using our lightweight panel weight savings of over 80 % are possible compared to a monolithic construction. In comparison to a monolithic organosheet laminate, a sandwich of the same stiffness requires less number of layers, which means considerable cost savings when using the ThermHex PP sandwich panel.

The panel consists of 0°/90° cross ply laminate skin layers made of continuous glass fiber reinforced polypropylene (GF/PP). The folded honeycomb core material consists of a polypropylene as well. This allows an optimal bonding between core and skin layers in the lamination process by thermoplastic welding. The sandwich can be pressed locally to a monolithic laminate which allows the thermoforming of multi-curved shell structures and the pressing of pressure stable monolithic joining surfaces in one step. The pressed areas offer the possibility of functional integration by means of injection molding. Hence, complex lightweight parts can be produced very cost-efficient in short cycle-times which is essential for many automotive applications.

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#### THERMHEX WABEN GMBH

Merseburger Str. 237  
D – 06130 Halle/Saale

Tel.: +49 345 131627 10  
Fax: +49 345 131627 19  
Email: [info@ThermHex.com](mailto:info@ThermHex.com)  
Web: [www.ThermHex.com](http://www.ThermHex.com)



ThermHex Waben is a licensee of EconCore NV (Belgium), the technology leader for cost-efficient sandwich material production technologies.



#### ADVANTAGES

- > Major cost reduction
- > Significant weight saving
- > High bending stiffness
- > Energy absorbent
- > Resistant to moisture, acids and bases
- > Easy resource-friendly converting
- > 100 % recyclable

### THERMHEX PP SANDWICH PANEL THERMHEX POLYPROPYLENE HONEYCOMB CORE WITH GF/PP SKIN





### PRODUCT DESCRIPTION

Sandwich thickness
Skin layer thickness
Core thickness
Cell size
Weight per unit area
Sandwich density
Core density
Bending stiffness (CD, L / MD, W)
Compressive strength (Z-direction) ASTM C365-57
Compressive modulus (Z-direction) ASTM C365-57
Shear strength (CD, L / MD, W) ASTM C273-61
Shear modulus CD, L / MD, W) ASTM C273-61

### 6THPP120CP820

6 mm
0,5 mm
5 mm
4 mm
2.400 - 2.460 g/m <sup>2</sup>
400 - 410 kg/m <sup>3</sup>
120 - 130 kg/m <sup>3</sup>
140-125 Nm (at 400 mm span length in 3PB test)
2,0 MPa (290 Psi)
60 MPa (5.800 Psi)
1,2 MPa – 0,5 MPa (101 Psi – 58 Psi)
50 MPa – 16 MPa (3.045 Psi – 870 Psi)

### 12THPP120CP820

12 mm
0,5 mm
11 mm
5 mm
3.120 - 3.240 g/m <sup>2</sup>
260 - 270 kg/m <sup>3</sup>
120 - 130 kg/m <sup>3</sup>
590-475 Nm (at 400 mm span length in 3PB test)
2,0 MPa (290 Psi)
140 MPa (5.800 Psi)
1,2 MPa – 0,5 MPa (101 Psi – 58 Psi)
50 MPa – 16 MPa (3.045 Psi – 870 Psi)

### 15THPP120CP820

15 mm
0,5 mm
14 mm
5 mm
3590 g/m <sup>2</sup>
235 - 245 kg/m <sup>3</sup>
120 - 130 kg/m <sup>3</sup>
900- 600 Nm (at 400 mm span length in 3PB test)
2,0 MPa (290 Psi)
140 MPa (5.800 Psi)
1,2 MPa – 0,5 MPa (101 Psi – 58 Psi)
50 MPa – 16 MPa (3.045 Psi – 870 Psi)

### 20THPP120CP820

20 mm
0,5 mm
19 mm
5 mm
4240 g/m <sup>2</sup>
210 - 220 kg/m <sup>3</sup>
120 - 130 kg/m <sup>3</sup>
1600- 700 Nm (at 400 mm span length in 3PB test)
2,4 MPa (290 Psi)
140 MPa (5.800 Psi)
1,2 MPa – 0,5 MPa (101 Psi – 58 Psi)
50 MPa – 16 MPa (3.045 Psi – 870 Psi)

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Core thickness
Cell size
Weight per unit area
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Core density
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Shear modulus CD, L / MD, W) ASTM C273-61

### 6THPP80CP580

6 mm
0,4 mm
5,2 mm
4 mm
1700 g/m <sup>2</sup>
280 - 290 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
90 - 70 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
25 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### 12THPP80CP580

12 mm
0,4 mm
11,2 mm
5 mm
2240 g/m <sup>2</sup>
180 - 190 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
420 - 290 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
40 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### 15THPP80CP580

15 mm
0,4 mm
14,2 mm
5 mm
2510 g/m <sup>2</sup>
165 - 175 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
600- 400 Nm (at 400 mm span length in 3PB test)
1,0 MPa (290 Psi)
40 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### 20THPP80CP580

20 mm
0,4 mm
19,2 mm
5 mm
2960 g/m <sup>2</sup>
145 - 155 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
1000 - 420 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
40 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

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Shear modulus CD, L / MD, W) ASTM C273-61

### 6THPP80GC340

6 mm
0,25 mm
5,5 mm
4 mm
1220 g/m <sup>2</sup>
200 - 210kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
28 - 18 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
25MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### 12THPP80GC340

12 mm
0,25 mm
11,5 mm
5 mm
1760 g/m <sup>2</sup>
140 - 150 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
110 - 80 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
40 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### 15THPP80GC340

15 mm
0,25 mm
14,5 mm
5 mm
2030 g/m <sup>2</sup>
130 - 140 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
170 - 120 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
40 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### 20THPP80GC340

20 mm
0,25 mm
19,5 mm
5 mm
2480 g/m <sup>2</sup>
120 - 130 kg/m <sup>3</sup>
80 - 90 kg/m <sup>3</sup>
320- 220 Nm (at 400 mm span length in 3PB test)
1,2 MPa (290 Psi)
40 MPa (5.800 Psi)
0,5 MPa – 0,3 MPa (101 Psi – 58 Psi)
15 MPa – 6 MPa (3.045 Psi – 870 Psi)

### SHARED DATA FOR ALL CONFIGURATIONS

Temperature range (°C)
Thermal conductivity W / mk
Fire-resistance
Chemical resistance
Standard dimension

- 30 to + 80; short term up to + 140

0,045	0,060	0,065	0,075
Normally inflammable, higher grades of fire-resistance can be obtained in sandwich elements when using specialized surface modification.			
Excellent resistance to water, most acids, bases and salt solutions.			
1200 mm x 2500 mm			

